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# GLOSSARY

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**Accuracy.** The degree of agreement between a measurement and its true value. The accuracy of a data set is assessed by evaluating results from standards or spikes containing known quantities of an analyte.

**Action plan.** An action plan addresses assessment findings and root causes that have been identified in an audit or an assessment report. It is intended to set forth specific actions that the site will undertake to remedy deficiencies. The plan includes a timetable and funding requirements for implementation of the planned activities.

**Alluvial fan.** A cone-shaped deposit of alluvium made by a stream where it runs out onto a level plain.

**Alluvium.** Sedimentary material deposited by flowing water such as a river.

**Aquifer.** A water-bearing unit of permeable rock or soil that will yield water in usable quantities to wells. *Confined aquifers* are bounded above and below by less permeable layers. Groundwater in a confined aquifer is under a pressure greater than the atmospheric pressure. *Unconfined aquifers* are bounded below by less permeable material but are not bounded above. The pressure on the groundwater at the surface of an unconfined aquifer is equal to that of the atmosphere.

**As low as reasonably achievable (ALARA).** An approach to radiation protection that advocates controlling or managing exposures (both individual and collective) to the work force and the general public and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. As used in DOE Order 5400.5, ALARA is not a dose limit but, rather, a process that has as its objective the attainment of dose levels as far below the applicable limits of the Order as practicable.

**Background radiation.** Natural and manmade radiation such as cosmic radiation and radiation from naturally radioactive elements and from commercial sources and medical procedures.

**Becquerel (Bq).** A unit of radioactivity equal to one nuclear transformation per second.

**Categorical exclusion.** A proposed action that normally does not require an environmental assessment or an environmental impact statement and that the Department of Energy has determined does not individually or cumulatively have a significant effect on the human environment. See 10 CFR 1021.410.

**Class A, B, and C low-level waste.** Waste classifications from the Nuclear Regulatory Commission's 10 CFR Part 61 rule. Maximum concentration limits are set for specific isotopes. Class A waste disposal is minimally restricted with respect to the form of the waste. Class B waste must meet more rigorous requirements to ensure physical stability after disposal. Greater concentration limits are set for the same isotopes in Class C waste, which also must meet physical stability requirements. Moreover, special measures must be taken at the disposal facility to protect against inadvertent intrusion.

**Compliance findings.** Conditions that may not satisfy applicable environmental or safety and health regulations, DOE Orders and memoranda, enforcement actions, agreements with regulatory agencies, or permit conditions.

**Confidence coefficient or factor.** The chance or probability, usually expressed as a percentage, that a confidence interval includes some defined parameter of a population. The confidence coefficients usually associated with confidence intervals are 90%, 95%, and 99%.

**Consistency.** The condition of showing steady conformity to practices. In the environmental monitoring program, approved procedures are in place in order to ensure that data collection activities are carried out in a consistent manner so that variability is minimized.

**Cosmic radiation.** High-energy subatomic particles from outer space that bombard the earth's atmosphere. Cosmic radiation is part of natural background radiation.

**Counting error.** The variability caused by the inherent random nature of radioactive disintegration and by the detection process.

**Curie (Ci).** A unit of radioactivity equal to 37 billion ( $3.7 \times 10^{10}$ ) nuclear transformations per second.

**Data set.** A group of data (e.g., factual information such as measurements or statistics) used as a basis for reasoning, discussion, or calculation.

**Decay (radioactive).** Disintegration of the nucleus of an unstable nuclide by spontaneous emission of charged particles and/or photons or by spontaneous fission.

**Derived concentration guide (DCG).** The concentration of a radionuclide in air and water that, under conditions of continuous exposure for one year by one exposure mode (i.e., ingestion of water, submersion in air, or inhalation), would result in an effective dose equivalent of 100 mrem (1 mSv). See Table K-1 in Appendix K.

**Detection limit or level.** The smallest amount of a substance that can be distinguished in a sample by a given measurement procedure at a given confidence level. (See **lower limit of detection**.)

**Dispersion (groundwater).** The process whereby solutes are spread or mixed as they are transported by groundwater as it moves through sediments.

**Dosimeter.** A portable device for measuring the total accumulated exposure to ionizing radiation.

**Downgradient.** The direction of water flow from a reference point to a selected point of interest. (See **gradient**.)

**Effective dose.** See **effective dose equivalent** under **radiation dose**.

**Effluent.** Any treated or untreated air emission or liquid discharge, including storm water runoff, at a DOE site or facility.

**Effluent monitoring.** Sampling or measuring specific liquid or gaseous effluent streams for the presence of pollutants.

**Enhanced work planning.** A process that evaluates and improves the program by which work is identified, planned, approved, controlled, and executed. The key elements are line management ownership, a graded approach to work management based on risk and complexity, worker involvement beginning at the earliest phases of work management, organizationally diverse teams, and organized, institution-wide communication.

**Environmental assessment.** An evaluation that provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. See 40 CFR 1508.9.

**Environmental impact statement.** A detailed statement that includes the environmental impact of the proposed action, any adverse environmental effects that cannot be avoided should the proposal be implemented, and alternatives to the proposed action. See Section 102 (2) (C) of the National Environmental Policy Act.

**Environmental management system.** The systematic application of business management practices to environmental issues, including defining the organizational structure, planning for activities, identifying responsibilities, and defining practices, procedures, processes, and resources.

**Environmental monitoring.** The collection and analysis of samples or the direct measurement of environmental media. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance.

**Environmental surveillance.** The collection and analysis of samples or the direct measurement of air, water, soil, foodstuff, and biota in order to determine compliance with applicable standards and permit requirements.

**Erg.** One-billionth (1E-09) of the energy released by a 100-watt bulb in 1 second.

**Evapotranspiration.** The combined total precipitation returned to the air through direct evaporation and by transpiration of vegetation.

**Exposure.** The subsection of a target (usually living tissue) to radiation.

**Fallout.** Radioactive materials mixed into the earth's atmosphere. Fallout constantly precipitates onto the earth.

**Finding.** A Department of Energy compliance term. A finding is a statement of fact concerning a condition in the Environmental, Safety, and Health program that was investigated during an appraisal. Findings include best management practice findings, compliance findings, and noteworthy practices. A finding may be a simple statement of proficiency or a description of deficiency (i.e., a variance from procedures or criteria). See also **self-assessment**.

**Fission.** The act or process of splitting into parts. A nuclear reaction in which an atomic nucleus splits into fragments, i.e., fission products, usually fragments of comparable mass, with the evolution of approximately 100 million to several hundred million electron volts of energy.

**Gamma isotopic (also gamma scan).** An analytical method by which the quantity of several gamma ray-emitting radioactive isotopes may be determined simultaneously. Typical nuclear fuel cycle isotopes determined by this method include but are not limited to Co-60, Zr-95, Ru-106, Ag-110m, Sb-125, Cs-134, Cs-137, and Eu-154. Naturally occurring isotopes for which samples also often are analyzed are Be-7, K-40, Ra-224, and Ra-226.

**Gradient.** Change in value of one variable with respect to another variable, especially vertical or horizontal distance.

**Groundwater.** Subsurface water in the pore spaces of soil and geologic units.

**Half-life.** The time in which half the atoms of a radionuclide disintegrate into another nuclear form. The half-life may vary from a fraction of a second to thousands of years.

**Hazardous waste.** A waste or combination of wastes that because of quantity, concentration, or physical, chemical, or infectious characteristics may: a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

**High-level waste (HLW).** The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of transuranic waste and fission products in concentrations sufficient to require permanent isolation. (See also **transuranic waste**.)

**Hydraulic conductivity.** The ratio of flow velocity to driving force for viscous flow under saturated conditions of a specified liquid in a porous medium; the ratio describing the rate at which water can move through a permeable medium.

**Integrated safety management system (ISMS).** The integrated safety management system (ISMS) describes the programs, policies, and procedures used by WVNS and the DOE to ensure that WVNS establishes a safe workplace for the employees, the public, and the environment. The guiding principles of ISMS are line management responsibility for safety; clear roles and responsibilities; competence commensurate with responsibilities; balanced priorities; identification of safety standards and requirements; hazard controls; and operations authorization.

**Interim status.** The status of any currently existing facility that becomes subject to the requirement to have a RCRA permit because of a new statutory or regulatory amendment to RCRA.

**Interstitial.** The (annular) space between the inner and outer tank walls in a double-walled storage tank.

**Ion.** An atom or group of atoms with an electric charge.

**Ion exchange.** The reversible exchange of ions contained in solution with other ions that are part of the ion-exchange material.

**Isotope.** Different forms of the same chemical element that are distinguished by having the same number of protons but a different number of neutrons in the nucleus. An element can have many isotopes. For example, the three isotopes of hydrogen are protium, deuterium, and tritium, with one, two, and three neutrons in the nucleus, respectively.

**Kame delta.** A conical hill or short irregular ridge of gravel or sand deposited in contact with glacier ice.

**Lacustrine sediments.** A sedimentary deposit consisting of material pertaining to, produced by, or formed in a lake or lakes.

**Land disposal restrictions (LDR).** Regulations promulgated by the U.S. EPA (and by NYSDEC in New York State) governing the land disposal of hazardous wastes. The wastes must be treated using the best demonstrated available technology or must meet certain treatment standards before being disposed.

**Lower limit of detection (LLD).** The lowest limit of a given parameter an instrument is capable of detecting. A measurement of analytical sensitivity.

**Low-level waste (LLW).** Radioactive waste not classified as high-level waste, transuranic waste, spent fuel, or uranium mill tailings. (See **Class A, B, and C low-level waste.**)

**Maximally exposed individual.** A hypothetical person who remains in an uncontrolled area who would, when all potential routes of exposure from a facility's operations are considered, receive the greatest possible dose equivalent.

**Mean.** The average value of a series of measurements.

**Metric ton.** A unit of mass equal to 1,000 kilograms.

**Millirem (mrem).** A unit of radiation dose equivalent that is equal to one one-thousandth of a rem. An individual member of the public can receive up to 500 millirems per year according to DOE standards. This limit does not include radiation received for medical treatment or the 100 to 360 mrem that people receive annually from background radiation.

**Minimum detectable concentration (MDC).** Depending on the sample medium, the smallest amount or concentration of a radioactive or nonradioactive analyte that can be reliably detected using a specific analytical method. Calculations of the minimum detectable concentrations are based on the lower limit of detection.

**Mixed waste.** A waste that is both radioactive and hazardous. Also referred to as radioactive mixed waste (RMW).

**n-Dodecane/tributyl phosphate.** An organic solution composed of 30% tributyl phosphate (TBP) dissolved in n-dodecane used to first separate the uranium and plutonium from the fission products in the dissolved fuel and then to separate the uranium from the plutonium.

**Neutron.** An electrically neutral subatomic particle in the baryon family with a mass 1,839 times that of an electron, stable when bound in an atomic nucleus, and having a mean lifetime of approximately 16.6 minutes as a free particle.

**Notice of violation.** A letter of notice from a regional water engineer in response to an instance of significant noncompliance with a SPDES permit. Generally, an official notification from a regulatory agency of noncompliance with permit requirements.

**Nucleus.** The positively charged central region of an atom, made up of protons and neutrons and containing almost all of the mass of the atom.

**Outfall.** The end of a drain or pipe that carries wastewater or other effluents into a ditch, pond, or river.

**Parameter.** Any of a set of physical properties whose values determine the characteristics or behavior of something (e.g., temperature, pressure, density of air). In relation to environmental monitoring, a monitoring parameter is a constituent of interest. Statistically, the term “parameter” is a calculated quantity, such as a mean or variance, that describes a statistical population.

**Particulates.** Solid particles and liquid droplets small enough to become airborne.

**Person-rem.** The sum of the individual radiation dose equivalents received by members of a certain group or population. It may be calculated by multiplying the average dose per person by the number of persons exposed. For example, a thousand people each exposed to one millirem would have a collective dose of one person-rem.

**Plume.** The distribution of a pollutant in air or water after being released from a source.

**Precision.** The degree of reproducibility of a measurement under a given set of conditions. Precision in a data set is assessed by evaluating results from duplicate field or analytical samples.

**Proglacial lake.** A lake occupying a basin in front of a glacier; generally in direct contact with the ice.

**Proton.** A stable, positively charged subatomic particle in the baryon family with a mass 1,836 times that of an electron.

**Pseudo-monitoring point.** A theoretical monitoring location rather than an actual physical location; a calculation based on analytical test results of samples obtained from other associated, tributary, monitored locations. (Point 116 at the WVDP is classified as a “pseudo” monitoring point because samples are not actually physically collected at that location. Rather, using analytical results from samples collected from “real” upstream outfall locations, compliance with the total dissolved solids limit in the WVDP’s SPDES permit is calculated for this theoretical point.)

**Quality factor.** The extent of tissue damage caused by different types of radiation of the same energy. The greater the damage, the higher the quality factor. More specifically, the factor by which absorbed doses are multiplied to obtain a quantity that indicates the degree of biological damage produced by ionizing radiation. (See **radiation dose**.) The factor is dependent upon radiation type (alpha, beta, gamma, or x-ray) and exposure (internal or external).

**Rad.** Radiation absorbed dose. One hundred ergs of energy absorbed per gram.

**Radiation.** The process of emitting energy in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

**Alpha radiation.** The least penetrating type of radiation. Alpha radiation can be stopped by a sheet of paper or the outer dead layer of skin.



**Beta radiation.** Electrons emitted from a nucleus during fission and nuclear decay. Beta radiation can be stopped by an inch of wood or a thin sheet of aluminum.

**Gamma radiation.** A form of electromagnetic, high-energy radiation emitted from a nucleus. Gamma rays are essentially the same as x-rays and require heavy shielding such as lead, concrete, or steel to be stopped.

**Internal radiation.** Radiation originating from a source within the body as a result of the inhalation, ingestion, or implantation of natural or manmade radionuclides in body tissues.

**Radiation dose:**

**Absorbed dose.** The amount of energy absorbed per unit mass in any kind of matter from any kind of ionizing radiation. Absorbed dose is measured in rads or grays.

**Collective dose equivalent.** The sum of the dose equivalents for all the individuals comprising a defined population. The per capita dose equivalent is the quotient of the collective dose equivalent divided by the population. The unit of collective dose equivalent is person-rem or person-sievert.

**Collective effective dose equivalent.** The sum of the effective dose equivalents for the individuals comprising a defined population. Units of measurement are person-rem or person-sieverts. The per capita effective dose equivalent is obtained by dividing the collective dose equivalent by the population. Units of measurement are rem or sieverts.

**Committed dose equivalent.** A measure of internal radiation. The predicted total dose equivalent to a tissue or organ over a fifty-year period after a known intake of a radionuclide into the body. It does not include contributions from sources of external penetrating radiation. Committed dose equivalent is measured in rem or sieverts.

**Committed effective dose equivalent.** The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighting factor. Committed effective dose equivalent is measured in rem or sieverts.

**Radioactivity.** A property possessed by some elements (such as uranium) whereby alpha, beta, or gamma rays are spontaneously emitted.

**Radioisotope.** A radioactive isotope of a specified element. Carbon-14 is a radioisotope of carbon. Tritium is a radioisotope of hydrogen. (See **isotope**.)

**Radionuclide.** A radioactive nuclide. Radionuclides are variations (isotopes) of elements. They have the same number of protons and electrons but different numbers of neutrons, resulting in different atomic masses. There are several hundred known nuclides, both manmade and naturally occurring.

**Rem.** An acronym for Roentgen Equivalent Man. A unit of radiation exposure that indicates the potential effect of radiation on human cells.

**Remote-handled waste.** At the WVDP, waste that has an external surface dose rate that exceeds 100 millirem per hour or a high level of alpha and/or beta surface contamination.

**Self-assessment.** Appraisals of work at the WVDP by individuals, groups, or organizations responsible for overseeing and/or performing the work. Self-assessments are intended to provide an internal review of performance to determine that specific functional areas are in programmatic and site-specific compliance with applicable DOE directives, WVDP procedures, and regulations.

**Finding.** A direct and significant violation of applicable Department of Energy, regulatory, or other procedural or programmatic requirements. A finding requires documented corrective action.

**Observation.** A condition that, while not a direct and significant violation of applicable Department of Energy, regulatory, or other procedural or programmatic requirements, could result in a finding if not corrected. An observation requires documented corrective action.

**Good practice.** A statement of proficiency or confirmed excellence worthy of documenting.

**Sievert.** A unit of dose equivalent from the International System of Units (Système Internationale). Equal to one joule per kilogram.

**Solid waste management unit (SWMU).** Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

**Spent fuel.** Nuclear fuel that has been used in a nuclear reactor; this fuel contains uranium, activation products, fission products, and plutonium.

**Spill.** A spill or release is defined as “any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or otherwise disposing of substances from the ordinary containers employed in the normal course of storage, transfer, processing, or use.”

**Stakeholder.** A person or group that has an investment, share, or interest in something. At the WVDP stakeholders include Project management, scientists, other employees, politicians, regulatory agencies, local and national interest groups, and members of the general public.

**Standard deviation.** An indication of the dispersion of a set of results around their average.

**Super solid waste management unit (SSWMU).** Individual solid waste management units that have been grouped and ranked into larger units — super solid waste management units — because some individual units are contiguous or so close together as to make monitoring of separate units impractical.

**Surface water.** Water that is exposed to the atmospheric conditions of temperature, pressure, and chemical composition at the surface of the earth.

**Surveillance.** The act of monitoring or observing a process or activity to verify conformance with specified requirements.

**Thermoluminescent dosimeter (TLD).** A device that luminesces upon heating after being exposed to radiation. The amount of light emitted is proportional to the amount of radiation to which the luminescent material has been exposed.

**Ton, metric (also tonne).** A unit of mass equal to 1,000 kilograms.

**Ton (short ton).** A unit of weight equal to 2,000 lbs or 907.1847 kilograms.

**Transuranic waste.** Waste containing transuranic elements, i.e., those elements with an atomic number greater than 92, including neptunium, plutonium, americium, and curium.

**Universal wastes.** Wastes subject to special management provisions that are intended to ease the management burden and facilitate recycling of such materials. Four types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, hazardous waste thermostats, and hazardous waste lamps.

**Upgradient.** Referring to the flow of water or air, “upgradient” is analogous to upstream. Upgradient is a point that is “before” an area of study that is used as a baseline for comparison with downstream data. See **gradient** and **downgradient**.

**Watershed.** The area contained within a drainage divide above a specified point on a stream.

**Water table.** The upper surface in a body of groundwater; the surface in an unconfined aquifer or confining bed at which the pore water pressure is equal to atmospheric pressure.

**X-ray.** Penetrating electromagnetic radiations having wave lengths shorter than those of visible light. They are usually produced by bombarding a metallic target with fast electrons in a high vacuum. In nuclear reactions it is customary to refer to photons originating in the nucleus as gamma rays and those originating in the extranuclear part of the atom as x-rays. These rays are sometimes called roentgen rays after their discoverer, W.C. Roentgen.

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# ACRONYMS AND ABBREVIATIONS

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|                        |  |
|------------------------|--|
| <b>ACM</b>             | Asbestos-containing material   |
| <b>ALARA</b>           | As Low As Reasonably Achievable  |
| <b>ANSI</b>            | American National Standards Institute  |
| <b>ASME</b>            | American Society of Mechanical Engineers                                       |
| <b>ASQ</b>             | American Society for Quality   |
| <b>BEIR</b>            | Committee on Biological Effects of Ionizing Radiation                          |
| <b>BOD<sub>5</sub></b> | Biochemical Oxygen Demand (5-day)  |
| <b>CAA</b>             | Clean Air Act  |
| <b>CDDL</b>            | Construction and Demolition Debris Landfill                                    |
| <b>CEDE</b>            | Committed Effective Dose Equivalent  |
| <b>CEMP</b>            | Code of Environmental Management Principles for Federal Agencies               |
| <b>CEQ</b>             | (President's) Council on Environmental Quality                                 |
| <b>CERCLA</b>          | Comprehensive Environmental Response, Compensation, and Liability Act          |
| <b>CFR</b>             | Code of Federal Regulations  |
| <b>CO</b>              | Certificate-to-Operate   |
| <b>CPC</b>             | Chemical Process Cell  |
| <b>CPC-WSA</b>         | Chemical Process Cell Waste Storage Area                                       |
| <b>CSPF</b>            | Container Sorting and Packaging Facility                                       |
| <b>CSRF</b>            | Contact Size-reduction Facility  |
| <b>CSS</b>             | Cement Solidification System   |
| <b>CWA</b>             | Clean Water Act  |
| <b>CWAP</b>            | Clean Water Action Plan  |
| <b>CX</b>              | Categorical Exclusion  |
| <b>CY</b>              | Calendar Year  |
| <b>DCG</b>             | Derived Concentration Guide  |
| <b>DMR</b>             | Discharge Monitoring Report  |
| <b>DOE</b>             | (U.S.) Department of Energy  |
| <b>DOE-EM</b>          | Department of Energy, Office of Environmental Restoration and Waste Management |
| <b>DOE-HQ</b>          | Department of Energy, Headquarters Office                                      |
| <b>DOE-OH</b>          | Department of Energy, Ohio Field Office  |
| <b>DOT</b>             | (U.S.) Department of Transportation  |

|                 |   |
|-----------------|---|
| <b>EA</b>       | Environmental Assessment                            |
| <b>EDE</b>      | Effective Dose Equivalent                           |
| <b>EHS</b>      | Extremely Hazardous Substance                       |
| <b>EIS</b>      | Environmental Impact Statement                      |
| <b>EML</b>      | Environmental Measurements Laboratory               |
| <b>EMS</b>      | Environmental Management System                     |
| <b>EPA</b>      | (U.S.) Environmental Protection Agency              |
| <b>EPCRA</b>    | Emergency Planning and Community Right-to-Know Act  |
| <b>ES&amp;H</b> | Environmental Safety and Health                     |
| <b>ESR</b>      | (WVDP) Effluent Summary Report                      |
| <b>EWP</b>      | Enhanced Work Planning                              |
| <b>FFC Act</b>  | Federal Facility Compliance Act                     |
| <b>FONSI</b>    | Finding of No Significant Impact                    |
| <b>FR</b>       | Federal Register                                    |
| <b>FRS</b>      | Fuel Receiving and Storage                          |
| <b>FSFCA</b>    | Federal and State Facility Compliance Agreement     |
| <b>FY</b>       | Fiscal Year   |
| <b>GEL</b>      | General Engineering Laboratory                      |
| <b>HEPA</b>     | High-efficiency Particulate Air (filter)            |
| <b>HLW</b>      | High-level (radioactive) Waste                      |
| <b>HPIC</b>     | High-pressure Ion Chamber                           |
| <b>HTO</b>      | Hydrogen Tritium Oxide                              |
| <b>HVAC</b>     | Heating, Ventilation, and Air Conditioning          |
| <b>ICRP</b>     | International Commission on Radiological Protection |
| <b>IRTS</b>     | Integrated Radwaste Treatment System                |
| <b>ISMS</b>     | Integrated Safety Management System                 |
| <b>ISO</b>      | International Organization for Standardization      |
| <b>LAS</b>      | Linear Alkylate Sulfonate                           |
| <b>LDR</b>      | Land Disposal Restriction                           |
| <b>LIMS</b>     | Laboratory Information Management System            |
| <b>LLD</b>      | Lower Limit of Detection                            |
| <b>LLW</b>      | Low-level (radioactive) Waste                       |
| <b>LLW2</b>     | Low-level (liquid) Waste Treatment Facility (new)   |
| <b>LLWTF</b>    | Low-level (liquid) Waste Treatment Facility (old)   |
| <b>LPS</b>      | Liquid Pretreatment System                          |
| <b>LSA</b>      | Lag Storage Area                                    |
| <b>LTR</b>      | License Termination Rule                            |
| <b>LWTS</b>     | Liquid Waste Treatment System                       |
| <b>MDC</b>      | Minimum Detectable Concentration                    |
| <b>MDL</b>      | Method Detection Limit                              |
| <b>MSDS</b>     | Material Safety Data Sheet                          |
| <b>MTAR</b>     | Monthly Trend Analysis Report                       |
| <b>MW</b>       | (Radioactive) Mixed Waste                           |

|                       |  |
|-----------------------|--|
| <b>NCRP</b>           | National Council on Radiation Protection and Measurements      |
| <b>NDA</b>            | Nuclear Regulatory Commission-licensed Disposal Area           |
| <b>NEPA</b>           | National Environmental Policy Act                              |
| <b>NESHAP</b>         | National Emission Standards for Hazardous Air Pollutants       |
| <b>NFS</b>            | Nuclear Fuel Services, Inc.                                    |
| <b>NGVD</b>           | National Geodetic Vertical Datum                               |
| <b>NIST</b>           | National Institute of Standards and Technology                 |
| <b>NOI</b>            | Notice of Intent   |
| <b>NO<sub>x</sub></b> | Nitrogen Oxides  |
| <b>NPOC</b>           | Nonpurgeable Organic Carbon                                    |
| <b>NPGRS</b>          | North Plateau Groundwater Recovery System                      |
| <b>NPDES</b>          | National Pollutant Discharge Elimination System                |
| <b>NRC</b>            | (U.S.) Nuclear Regulatory Commission                           |
| <b>NTU</b>            | Nephelometric Turbidity Unit                                   |
| <b>NYCRR</b>          | New York Official Compilation of Codes, Rules, and Regulations |
| <b>NYSDEC</b>         | New York State Department of Environmental Conservation        |
| <b>NYSDOH</b>         | New York State Department of Health                            |
| <b>NYSDEL</b>         | New York State Department of Labor                             |
| <b>NYSERDA</b>        | New York State Energy Research and Development Authority       |
| <b>NYSGS</b>          | New York State Geological Survey                               |
| <b>OH/WVDP</b>        | Department of Energy, West Valley Demonstration Project        |
| <b>OSHA</b>           | Occupational Safety and Health Act                             |
| <b>OSR</b>            | Operational Safety Requirement                                 |
| <b>OVE</b>            | Outdoor Ventilated Enclosure                                   |
| <b>PC</b>             | Permit-to-Construct  |
| <b>PCB</b>            | Polychlorinated Biphenyl                                       |
| <b>PQL</b>            | Practical Quantitation Limit                                   |
| <b>PTW</b>            | Permeable Treatment Wall                                       |
| <b>PVS</b>            | Permanent Ventilation System                                   |
| <b>PVU</b>            | Portable Ventilation Unit                                      |
| <b>QA</b>             | Quality Assurance  |
| <b>QAP</b>            | Quality Assessment Program (also Quality Assurance Program)    |
| <b>QC</b>             | Quality Control  |
| <b>RCRA</b>           | Resource Conservation and Recovery Act                         |
| <b>RFI</b>            | RCRA Facility Investigation                                    |
| <b>RHWF</b>           | Remote-handled Waste Facility                                  |
| <b>SAR</b>            | Safety Analysis Report   |
| <b>SARA</b>           | Superfund Amendments and Reauthorization Act                   |
| <b>SD</b>             | Standard Deviation   |
| <b>SDA</b>            | (New York) State-licensed Disposal Area                        |
| <b>SDWA</b>           | Safe Drinking Water Act  |
| <b>SER</b>            | Site Environmental Report                                      |
| <b>SI</b>             | Système Internationale (International System of Units)         |

|                       |  |
|-----------------------|--|
| <b>SO<sub>2</sub></b> | Sulfur Dioxide                               |
| <b>SPDES</b>          | State Pollutant Discharge Elimination System |
| <b>STS</b>            | Supernatant Treatment System                 |
| <b>SVOC</b>           | Semivolatile Organic Compound                |
| <b>SWMU</b>           | Solid Waste Management Unit                  |
| <b>SSWMU</b>          | Super Solid Waste Management Unit            |
| <b>TBP</b>            | Tributyl Phosphate                           |
| <b>TDS</b>            | Total Dissolved Solids                       |
| <b>TLD</b>            | Thermoluminescent Dosimetry                  |
| <b>TOC</b>            | Total Organic Carbon                         |
| <b>TOX</b>            | Total Organic Halogens                       |
| <b>TRI</b>            | Toxic Release Inventory                      |
| <b>TRU</b>            | Transuranic                                  |
| <b>TSCA</b>           | Toxic Substances Control Act                 |
| <b>TSDF</b>           | Treatment, Storage, and Disposal Facility    |
| <b>USGS</b>           | United States Geological Survey              |
| <b>VOC</b>            | Volatile Organic Compound                    |
| <b>WNYNSC</b>         | Western New York Nuclear Service Center      |
| <b>WRG</b>            | Work Review Group                            |
| <b>WVDP</b>           | West Valley Demonstration Project            |
| <b>WVNS</b>           | West Valley Nuclear Services Company         |
| <b>WWTF</b>           | Wastewater Treatment Facility                |

# Units of Measure

| Radioactivity | <i>Symbol</i> | <i>Name</i>                | Volume    | <i>Symbol</i>   | <i>Name</i>                      |
|---------------|---------------|----------------------------|-----------|-----------------|----------------------------------|
|               | Ci            | curie                      |           | cm <sup>3</sup> | cubic centimeter                 |
|               | mCi           | millicurie (1E-03 Ci)      |           | L               | liter                            |
|               | μCi           | microcurie (1E-06 Ci)      |           | mL              | milliliter                       |
|               | nCi           | nanocurie (1E-09 Ci)       |           | m <sup>3</sup>  | cubic meter                      |
|               | pCi           | picocurie (1E-12 Ci)       |           | gal             | gallon                           |
|               | Bq            | becquerel (27 pCi)         |           | ft <sup>3</sup> | cubic feet                       |
|               |               |                            |           | ppm             | parts per million                |
|               |               |                            |           | ppb             | parts per billion                |
| Dose          | <i>Symbol</i> | <i>Name</i>                | Area      | <i>Symbol</i>   | <i>Name</i>                      |
|               | Sv            | sievert (100 rems)         |           | ha              | hectare (10,000 m <sup>2</sup> ) |
|               | mSv           | millisievert (1E-03 Sv)    |           |                 |                                  |
|               | Gy            | gray (100 rads)            |           |                 |                                  |
|               | mrem          | millirem                   |           |                 |                                  |
| Concentration | <i>Symbol</i> | <i>Name</i>                | Length    | <i>Symbol</i>   | <i>Name</i>                      |
|               | μCi/mL        | microcuries per milliliter |           | m               | meter                            |
|               | mL/L          | milliliters per liter      |           | km              | kilometer (1E+ 03 m)             |
|               | μCi/g         | microcuries per gram       |           | cm              | centimeter (1E-02 m)             |
|               | mg/L          | milligrams per liter       |           | mm              | millimeter (1E-03 m)             |
|               | μg/mL         | micrograms per milliliter  |           | μm              | micrometer (1E-06 m)             |
|               | pCi/L         | picocuries per liter       |           |                 |                                  |
| Mass          | <i>Symbol</i> | <i>Name</i>                | Flow Rate | <i>Symbol</i>   | <i>Name</i>                      |
|               | g             | gram                       |           | mgd             | million gallons per day          |
|               | kg            | kilogram (1E+ 03 g)        |           | cfm             | cubic feet per minute            |
|               | mg            | milligram (1E-03 g)        |           | Lpm             | liters per minute                |
|               | μg            | microgram (1E-06 g)        |           | gpd             | gallons per day                  |
|               | ng            | nanogram (1E-09 g)         |           |                 |                                  |
|               | t             | metric ton (1E+ 06 g)      |           |                 |                                  |

## Unit Prefixes

|       |  |
|-------|--|
| centi | $1/100 = 1 \times 10^{-2} = 0.01 = \text{E-02}$                          |
| milli | $1/1,000 = 1 \times 10^{-3} = 0.001 = \text{E-03}$                       |
| micro | $1/1,000,000 = 1 \times 10^{-6} = 0.000001 = \text{E-06}$                |
| nano  | $1/1,000,000,000 = 1 \times 10^{-9} = 0.000000001 = \text{E-09}$         |
| pico  | $1/1,000,000,000,000 = 1 \times 10^{-12} = 0.000000000001 = \text{E-12}$ |



# Scientific Notation

Scientific notation may be used to express very large or very small numbers. A number smaller than 1 is expressed with a negative exponent, e.g.,  $1.3 \times 10^{-6}$ . To convert this number to decimal form, the decimal point is moved left by the number of places equal to the exponent. Thus,  $1.3 \times 10^{-6}$  becomes 0.0000013.

A number larger than 10 is expressed with a positive exponent, e.g.,  $1.3 \times 10^6$ . To convert this number to decimal form, the decimal point is moved right by the number of places equal to the exponent. Thus,  $1.3 \times 10^6$  becomes 1,300,000.

The power of 10 also is expressed as E. For example,  $1.3 \times 10^{-6}$  also can be written as 1.3E-06. The chart below shows equivalent exponential and decimal values.

|                      |   |       |   |            |               |
|----------------------|---|-------|---|------------|---------------|
| $1.0 \times 10^2$    | = | 1E+02 | = | 100        |               |
| $1.0 \times 10^1$    | = | 1E+01 | = | 10         |               |
| $1.0 \times 10^0$    | = | 1E+00 | = | 1          |               |
| $1.0 \times 10^{-1}$ | = | 1E-01 | = | 0.1        |               |
| $1.0 \times 10^{-2}$ | = | 1E-02 | = | 0.01       |               |
| $1.0 \times 10^{-3}$ | = | 1E-03 | = | 0.001      |               |
| $1.0 \times 10^{-4}$ | = | 1E-04 | = | 0.0001     |               |
| $1.0 \times 10^{-5}$ | = | 1E-05 | = | 0.00001    |               |
| $1.0 \times 10^{-6}$ | = | 1E-06 | = | 0.000001   | One Millionth |
| $1.0 \times 10^{-7}$ | = | 1E-07 | = | 0.0000001  |               |
| $1.0 \times 10^{-8}$ | = | 1E-08 | = | 0.00000001 |               |

# Conversion Chart

Both traditional radiological units (curie, roentgen, rad, rem) and the Systeme Internationale (S.I.) units (becquerel, gray, sievert) are used in this report. Nonradiological measurements are presented in metric units with the English equivalent noted in parentheses.

|                   |   |   |
|-------------------|---|---|
| 1 centimeter (cm) | = | 0.3937 inches (in)  |
| 1 meter (m)       | = | 39.37 inches (in) = 3.28 feet (ft)                        |
| 1 kilometer (km)  | = | 0.62 miles (mi)   |
| 1 milliliter (mL) | = | 0.0338 ounces (oz)  |
|                   | = | 0.061 cubic inches (in <sup>3</sup> )                     |
|                   | = | 1 cubic centimeter (cm <sup>3</sup> )                     |
| 1 liter (L)       | = | 1.057 quarts (qt)   |
|                   | = | 61.02 cubic inches (in <sup>3</sup> )                     |
| 1 gram (g)        | = | 0.0353 ounces (oz)  |
|                   | = | 0.0022 pounds (lbs)                                       |
| 1 kilogram (kg)   | = | 2.2 pounds (lbs)  |
| 1 curie (Ci)      | = | $3.7 \times 10^{10}$ disintegrations per second (d/s)     |
| 1 becquerel (Bq)  | = | 1 disintegration per second (d/s)                         |
|                   | = | 27 picocuries (pCi)                                       |
| 1 roentgen (R)    | = | $2.58 \times 10^{-4}$ coulombs per kilogram of air (C/kg) |
| 1 rad             | = | 0.01 gray (Gy)  |
| 1 rem             | = | 0.01 sievert (Sv)   |
| 1 millirem (mrem) | = | 0.001 rem   |

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Roesch, C.T.  
Scalise, D.M.  
Sheridan, M. J.  
Skiba, K.S.  
Spector, H.L.  
Steiner, A.F.  
Steiner, D.R.  
Steiner, R.E.  
Valenti, P.J.  
Wilcox, J.M.  
Wrotniak, C.M.  
Zadins, Z.Z.



### ***Spent Fuel Shipping***

*125 assemblies remaining at the WVDP will be shipped to INEEL in 2001.*



### ***Waste Management Services Projects***

*The WVDP is now shipping low-level waste off-site by rail.*



### ***Vitrification Facility Closure (VEMP)***

*Expended materials from the vitrification facility are being inventoried and sorted for disposal.*



### ***High-level Waste Tanks Closure***

*Liquid high-level waste storage tanks will be closed following decisions on long-term site management.*



### ***Remote-handled Waste Projects***

*A new facility under construction will be used to prepare higher activity wastes for shipment for off-site disposal.*



### ***Facility Closure Projects***

*To complete the West Valley Demonstration Project Act, facilities used to carry out solidification of the high-level waste will be decontaminated and decommissioned in preparation for long-term management decisions.*



### ***Environmental Projects***

*Site-wide environmental monitoring and management projects such as the pilot permeable treatment wall being used to evaluate groundwater decontamination methods will continue to ensure the safety of the public and the environment.*

